

Patent claims

1. Method for control of the point in time of the measurement of the toner concentration in a developer mixture comprising toner and carrier,
 - 5 - in which the developer mixture is mixed a by [sic] bucket roller (3) provided with buckets (8) and situated in a mixing device (7),
 - in which a toner concentration sensor (10) for measurement of the toner concentration in the developer mixture is arranged adjacent to the bucket roller (3),
 - 10 - in which magnet rails (9) are arranged on the buckets (8) of the bucket roller (3), and the respective magnet rail (9) is disconnected in each bucket except one in a region adjacent to the toner concentration sensor (10),
 - in which the toner concentration sensor (10) emits a sensor signal (SS) indicating the toner concentration, which sensor signal (SS) exhibits a pulse-shaped spike (SP) upon the passage of the bucket (8) with the uninterrupted magnet rail,
 - 15 - in which the point in time of the occurrence of this pulse-shaped spike (SP) is determined,
 - in which the measurement of the toner concentration occurs via the toner concentration sensor (10) in a measurement window (MF) that lies after the occurrence of the pulse-shaped spike (SP) of the sensor signal (SS), in a region of the sensor signal (SS) at which no further bucket (8) passes by the toner concentration sensor (10).
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2. Method for control of the point in time of the measurement of the toner concentration in a developer mixture comprising toner and carrier,
 - in which the developer mixture is mixed by a bucket roller (3) provided with buckets (8) and situated in a mixing device (7),

- in which a toner concentration sensor (10) for measurement of the toner concentration in the developer mixture is arranged adjacent to the bucket roller (3),
- 5 - in which a magnet (11) is arranged on a shaft (13) of the bucket roller (3) and a Hall sensor (12) is arranged adjacent to the magnet (11), which Hall sensor (12) emits a trigger signal when the magnet (11) passes by the Hall sensor (12),
- 10 - in which the measurement of the toner concentration by the toner concentration sensor (10) occurs controlled by the trigger signal in a measurement window (MF) that lies in a region of the sensor signal (SS) at which no further bucket (8) passes by the toner concentration sensor (10).

3. Method according to claim 2,

- 15 - in which magnet rails (9) are arranged on the buckets (8) of the bucket roller (3), and the respective magnet rail (9) is disconnected in each bucket except one in a region adjacent to the toner concentration sensor (10),
- 20 - in which the toner concentration sensor (10) emits a sensor signal (SS) indicating the toner concentration, which sensor signal (SS) exhibits a pulse-shaped spike (SP) upon the passage of the bucket (8) with the uninterrupted magnet rail.

4. Method according to claim 3,

- 25 in which the time interval ($t(\text{Excavator})$) of the trigger signal is determined once at the occurrence of the pulse-shaped spike (SP) of the sensor signal (SS), and the opening of the measurement window (MF) occurs when the sum from this time interval ($t(\text{Excavator})$) and a predetermined delay period ($t(\text{Delay})$) has elapsed.

5. Method according to any of the claims 1, 3 or 4, in which the temporal position of the pulse-shaped spike (SP) is indicated when the sensor signal (SS) has the largest rise.
- 5 6. Method according to claim 5, in which, to record the signal curve of the sensor signal (SS),
 - successive individual measurements of the sensor signal (SS) are implemented at the same time interval,
 - the difference of the successive measurement values (amplitude values) acquired via the individual measurements is generated,
 - 10 - the highest determined difference value (DF) indicates the position of the pulse-shaped spike (SP).
7. Method according to claim 6, in which the temporal position of the pulse-shaped spikes is indicated when the curve generated from the difference values (DF) exceeds a predetermined threshold (SW1).
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8. Method according to claim 1, 3 or 4, in which the temporal position of the pulse-shaped spikes (SP) is indicated when the pulse-shaped spikes (SP) of the sensor signal (SS) exceeds a predetermined threshold (SW2) or, respectively, reaches its highest value.
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9. Method according to claim 5 or 8, in which the temporal position of the pulse-shaped spikes (SP) is indicated when a combination rise/amplitude exceeds a threshold.
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10. Method according to any of the preceding claims 1, 3 through 9, in which, upon occurrence of the pulse-shaped spike (SP), the measurement window (MF) is opened after a time period (dependent on the rotation speed of the bucket roller (3)) calculated from the temporal position of the pulse-shaped spike (SP).
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11. Method according to any of the claims 1, 3 through 9, in which the measurement window (MF) is opened when, after occurrence of the pulse-shaped spike (SP), at least one further bucket passes by the toner concentration sensor (10).
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12. Method according to claim 1, 3 through 11, in which the measurement window (MF) is opened independent of the sensor signal curve for the case that no pulse-shaped spike (SP) has occurred in the sensor signal (SS) during a rotation of the bucket roller (3).
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13. Method according to claim 12, in which an error counter is incremented when no pulse-shaped spike (SP) is determined in the sensor signal (SS) during a revolution of the bucket roller (3); the error counter is decremented again when a pulse-shaped spike occurs again in the next revolution.
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14. Method according to claim 13, in which an error signal is emitted when the counter value of the error counter exceeds a predetermined counter value.
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15. Method according to any of the preceding claims, in which the mixing device is arranged in a developer station (2) for an electrophotographic printer or copier.
- 25 16. Arrangement for control of the point in time of the measurement of the toner concentration in a developer mixture comprising toner and carrier,
- in which a bucket roller (3) with whose buckets (8) the developer mixture is stirred is arranged in a mixing device (7) for the developer mixture,

- in which a toner concentration sensor (10) for measurement of the toner concentration in the developer mixture is arranged adjacent to the bucket roller (3),
- 5 - in which magnet rails (9) are arranged on the buckets (8) of the bucket roller (3), and the respective magnet rail (9) is disconnected in each bucket except one in a region adjacent to the toner concentration sensor (10),
- 10 - in which the toner concentration sensor (10) emits a sensor signal (SS) measuring the toner concentration, which sensor signal (SS) exhibits, upon the passage of the bucket (8) with the uninterrupted magnet rail, a pulse-shaped spike (SP) determined according to the method according to claim 5 through 11 from which a measurement window (MF) can be derived in which the toner concentration is measured.

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17. Arrangement for control of the point in time of the measurement of the toner concentration in a developer mixture comprising toner and carrier,

- in which a bucket roller (3) with whose buckets (8) the developer mixture is stirred is arranged in a mixing device (7) for the developer mixture,
- 20 - in which a toner concentration sensor (10) that emits a sensor signal (SS) dependent on the toner concentration is arranged adjacent to the bucket roller (3),
- 25 - in which a magnet (11) is arranged on a shaft (13) of the bucket roller (3) and a Hall sensor (12) is arranged adjacent to the magnet (11), which Hall sensor (12) emits a trigger signal when the magnet (11) passes by the Hall sensor (12),
- 30 - in which the measurement of the toner concentration by the toner concentration sensor (10) occurs controlled by the trigger signal in a measurement window (MF) that lies in a region of the sensor signal

(SS) at which no bucket (8) passes by the toner concentration sensor (10).

18. Arrangement according to claim 17,
- 5 - in which magnet rails (9) are arranged on the buckets (8) of the bucket roller (3), and the respective magnet rail (9) is disconnected in each bucket except one in a region adjacent to the toner concentration sensor (10),
- 10 - in which the toner concentration sensor (10) emits a sensor signal (SS) indicating the toner concentration, which sensor signal (SS) exhibits a pulse-shaped spike (SP) upon the passage of the bucket (8) with the uninterrupted magnet rail,
- 15 - in which the pulse-shaped spike (SP) is determined and the measurement window (MF) is established dependent on the time interval $t(\text{Excavator})$ trigger signal [sic] at the occurrence of the pulse-shaped spike (SP) of the sensor signal (SS), delayed by a delay period ($t(\text{delay})$).
19. Arrangement according to claim 18, in which the magnet (11) and the Hall sensor (12) are arranged outside of the mixing region of the mixing device.
- 20 20. Printer or copier comprising an arrangement according to any of the claims 16 through 19.